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Hyperuricemia in psoriasis and psoriatic arthritis

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Abstract
Aim: Psoriasis is a common, chronic, disfiguring, inflammatory, non-infectious skin disorder associated with cardiovascular diseases, obesity, diabetes mellitus, hypertension, and hyperlipidemia. The association between psoriasis and hyperuricemia was also reported. Therefore, we aimed to evaluate serum uric acid levels in psoriasis and psoriatic arthritis (PsA) patients.
Material and Methods: The study involved one hundred twenty (64 males and 56 females) patients, including 88 with psoriasis vulgaris and 32 with PsA, matched for age and sex with 120 healthy controls. Disease activity scores using Psoriasis Area Severity Index (PASI) score and Disease Activity Score using 28 joints (DAS28) were estimated for all patients. In addition, serum uric acid levels were measured for all the study participants.
Results: Serum uric acid levels were 6.2±2.5 mg/dl and 4.1±1.2 mg/dl for psoriatic patients and controls, respectively. High serum uric acid levels were associated with high PASI scores and high DAS28 in psoriatic and PsA patients, respectively.
Discussion: Psoriasis and PsA are significantly associated with hyperuricemia. Hyperuricemia is correlated to high PASI and high DAS28.

Keywords
Hyperuricemia, Psoriasis, Psoriatic Arthritis, Serum Uric Acid

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Introduction

Psoriasis is a chronic, non-contagious skin disorder characterized by chronic inflammation and hyperproliferation of skin cells, leading to the formation of erythematous, well-defined plaques with silvery-white dry loose scales, usually over extensor aspects of the body.[1] The estimated prevalence ranges between 1% and 3%, making this disorder a serious health problem, which can occur at any age and is mostly affects the age group of 50-69.[2] Psoriatic arthritis, which is inflammatory arthritis, develops in 30% of patients with Psoriasis. Psoriasis and PsA affect women and men equally.[3] PsA may involve both the axial skeleton (spondylitis and/or sacroiliitis) and the peripheral joints. It also affects skin, nails, and enthuses.[3] Psoriasis is known to be associated with hypertension, cardiovascular diseases, diabetes mellitus, hyperlipidemia, obesity, and metabolic syndrome. It is a proliferative disease with a rapid and high turnover of skin cells, 10 times faster than normal, and increased serum uric acid levels.[4] Studies conducted in Russia and Germany revealed higher serum uric acid levels in patients with Psoriasis [5,6]. In addition, high serum uric acid levels are also associated with the components of metabolic syndrome like obesity, hypertension, and cardiovascular diseases [7]. In patients with psoriasis, hyperuricemia is associated with metabolic abnormalities. Therefore, it may cause several health-related comorbidities. These comorbidities can further decrease the quality of life of psoriatic patients who are already upset from the unsightly chronic disfiguring skin lesion [8]. Therefore routine screening of serum uric acid levels should be carried out for patients with Psoriasis. Presently, there is no work being done in Iraq that assessed the association between hyperuricemia and Psoriasis. Therefore, we conducted this study to determine this association.

Material and Methods

This case-control study was carried out in Dermatology and Rheumatology outpatient departments in Basrah Teaching Hospital from April 2020 to April 2021. A sample of 120 (64 males and 56 females) patients was divided into two subgroups: 88 patients with Psoriasis, diagnosed by a dermatologist in the dermatology outpatient, and 32 patients with PsA, who fulfilled the classification criteria of PsA [9]. In addition, this study included 120 (60 males and 60 females), age- and sex-matched controls, recruited from the general population. Data collection was done through an interview with the patients using a special questionnaire developed by the researchers. The questionnaire included information about age, sex, disease duration, and drug history. Psoriatic and PsA patients were investigated for complete blood cell count and erythrocyte sedimentation rate (ESR). Serum uric acid levels were measured for both the patient group and controls. Psoriasis area and severity index (PASI) [10] were calculated for each patient with Psoriasis. For each of four anatomic areas (head, upper limb, trunk, and lower limbs), the severity of erythema, induration, and scaling and the percentage of surface area involvements were assessed. PASI scores can range from a lower value of 0, corresponding to no signs of Psoriasis, up to a 72.0 as maximum. Disease activity score using 28 joints (DAS28) and ESR [11] was measured for all patients with PsA. Postmenopausal, pregnant and lactating women, elderly patients, patients with endocrine, metabolic, renal problems, and patients using systemic steroids or any drugs that are known to affect serum uric acid level were excluded from the study. The local ethics committee approved the study design. Verbal consent was obtained from all participants before their involvement.

Statistical analyses

SPSS software version 25.0 was used for data analysis. Percentages and mean were used to present the data in tables. In addition, a comparison of study groups was carried out using the Chi-square test for categorical data and Student's t-test for continuous data. P <0.05 was considered statistically significant.

Results

Of the total sample of 120 patients (88 with Psoriasis and 32 with PsA), 64 (53.34%) patients were males, and 56 (46.66%) were females, with the mean age of 41±3.5 and disease duration of 10±5.3. There were 120 (60 males and 60 females) individuals in the control group with a mean age of 43±2.5 years. Serum uric acid levels were 6.2±2.5 mg/dl and 4.1±1.2 mg/dl for patients and controls, respectively; the difference was statistically significant (p=0.002), as shown in Table 1. Serum uric acid level was 6.2±2.4 mg/dl in patients with Psoriasis, which was slightly higher than that of patients with PsA, but the difference was not statistically significant (>0.05), as shown in Table 1. Table 2 shows the correlation between serum uric acid levels and disease duration, which were 24.8±4.8 ng/ml in

Table 1. Demographic and serum uric acid levels in patient subgroups and controls

Characteristics	Patient group	controls	P-value
Total no	120 (100%)	120 (100%)	>0.05
Psoriasis	88 (73.34%)		
Psoriatic arthritis	32 (26.66%)		
Male	64 (53.34%)	60 (50%)	>0.05
Female	56 (46.66%)	60 (50%)	>0.05
Mean age ± SD	41±3.5	42±2.4	>0.05
Disease duration±SD	10±5.3		
Serum uric acid ±SD	6.2±2.5	4.1±1.2	0.002
Serum uric acid ±SD	In psoriasis 6.2±2.4	In psoriatic arthritis 6.1±1.3	>0.05

Table 2. Correlation between serum uric acid levels and disease duration

Serum uric acid	< 10 years	≥ 10 years	P-value
	6.2±1.2	8.5±2.7	<0.05

Table 3. Correlation between serum uric acid levels and disease activity in psoriasis and PsA

	Serum uric acid	P-value
HIGH PASI	6.9±4.2	<0.05
LOW PASI	5.5±2.2	
HIGH DAS28	7.0±3.6	<0.05
LOW DAS28	5.4±2.3	

patients with disease duration <10 years, and 14.4±6.5 ng/ml in patients with disease duration equal and more than 10 years, the difference was statistically significant (p<0.05). Serum uric acid levels in patients with Psoriasis were 6.9±4.2 ng/ml and 5.5±2.2 ng/ml for high PASI and low PASI; respectively, the difference was statistically significant (p<0.05). Serum uric acid levels in patients with PsA were 7.0±3.6 ng/ml and 5.4±2.3 ng/ml for high DAS28 and low DAS28, respectively; accordingly, the difference was statistically significant (p<0.05) as shown in Table 3.

Discussion

Psoriasis is characterized by hyper-proliferation of keratinocytes which requires an increased rate of DNA formation. Consequently, DNA degradation also occurs at a higher rate. This increased cell turnover leads to an increased rate of purine formation and metabolism as purines are a fundamental part of DNA. Uric acid is endogenously formed as a product of the metabolic breakdown of purines. Increased degradation of purines may be reflected as higher levels of serum uric acid in psoriasis patients. Elevated serum uric acid levels may further be a risk factor for hypertension, renal disease, gout, and cardiovascular diseases [12, 13]. In this study, there were 64 (53.34%) male and 56 (46.66%) female patients with a male to female ratio of 2:1.75. A similar male predominance among psoriatic patients has been reported by Gisondi et al., Haider et al., and Ejaz et al. [14–16], and was in accordance with a study done in Japan by Takahashi et al. where the ratio was 1.98:1 done [17]. In this study, serum uric acid levels were observed to be higher among patients (mean serum uric acid =7.1±1.5 mg/dl) as compared to controls (mean serum uric acid =4.2±1.2 mg/dl). This was in accordance with the studies conducted by Gisondi et al., Khan et al., Yilmaz et al. [7,14,18]. The higher serum uric acid levels among patients with psoriasis can be explained by an increased rate of purine metabolism due to the rapid epidermal turnover, leading to accumulation of uric acid, which is the end product of purine degradation. Contrasting results were reported by Nicolae et al. and Agravatt et al., who found no correlation between serum uric acid level and psoriasis [19,20]. This study showed no difference in serum uric acid levels among patients with psoriasis and psoriatic arthritis. In this study, a higher serum uric acid level was found to be associated with a long disease duration, which is in accordance with a study done by Maryam Ghiasi et al. [21] who found that serum uric acid levels were in the normal range but the value was significantly higher in patients with a more severe form of psoriasis, and uric acid level was exacerbated by an increases in the severity and duration of psoriasis. The association between hyperuricemia and the extent of body surface area (BSA) involvement reflected by the PASI score has been evaluated in some earlier studies. In 2011, Kwon et al. [22] reported the relationship between the extent of BSA involvement and serum uric acid level was statistically highly significant. Gisondi et al. found that serum uric acid levels were significantly higher in patients with PASI scores of >10 when compared to those with PASI scores of <10 [14]. These findings agree with our result; we found a significant correlation between high serum uric acid levels and high PASI scores. In contrast to our result, Collazo et al. [23] reported that this relation was not statistically significant. A study by Bruce IN et al. on hyperuricemia in psoriatic arthritis found that there was no association between PASI score and hyperuricemia [24]. A study by Brenner W et al. on serum uric acid levels in PUVA-treated and untreated patients with psoriasis showed no relationship between the serum uric acid level and the extent of psoriatic skin involvement, indicating that increased epidermal turnover may not play a role in psoriatic hyperuricemia. They also mentioned that the elevated uric acid levels in psoriasis may be explained by a combination of genetic predisposition and hyperalimentation [25]. In this study, hyperuricemia was associated with higher disease activity in patients with PsA. No similar finding was reported in the literature for comparison.

Conclusion

Psoriasis and PsA are significantly associated with hyperuricemia. In addition, hyperuricemia is correlated to high disease activity in both psoriasis and PsA.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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